

CLAIMS

1. A method of accessing a wireless multiple-access communication system, comprising:
 - determining a current operating state of a terminal;
 - selecting one random access channel from among at least two random access channels based on the current operating state; and
 - transmitting a message on the selected random access channel to access the system.
2. The method of claim 1, wherein the at least two random access channels include a first random access channel used by registered terminals for system access and a second random access channel used by registered and unregistered terminals for system access.
3. The method of claim 2, wherein transmissions on the first random access channel are compensated for propagation delay.
4. The method of claim 1, wherein the current operating state is indicative of whether or not the terminal has registered with the system.
5. The method of claim 1, wherein the current operating state is indicative of whether or not the terminal can compensate for propagation delay to an access point receiving the message.
6. The method of claim 1, wherein the current operating state is indicative of whether or not a particular received signal-to-noise ratio (SNR) is achieved for the terminal.

7. The method of claim 1, further comprising:
retransmitting the message until an acknowledgment is received for the message
or a maximum number of access attempts has been exceeded.
8. The method of claim 1, further comprising:
if access is not gained via the selected random access channel, transmitting
another message on another random access channel selected from among the at least
two random access channels.
9. The method of claim 1, wherein the transmitting includes
selecting a slot from among a plurality of slots available for the selected random
access channel, and
transmitting the message in the selected slot.
10. The method of claim 1, wherein the message includes an identifier for the
terminal.
11. The method of claim 10, wherein the identifier is unique to the terminal.
12. The method of claim 10, wherein the identifier is a common identifier used by
unregistered terminals.
13. The method of claim 1, wherein the multiple-access communication system
supports terminals with single antenna and terminals with multiple antennas.
14. The method of claim 1, wherein the multiple-access communication system uses
orthogonal frequency division multiplexing (OFDM).

15. A method of accessing a wireless multiple-access multiple-input multiple-output (MIMO) communication system, comprising:
 - determining whether a terminal is registered or unregistered with the system;
 - if the terminal is registered, transmitting a first message on a first random access channel to access the system; and
 - if the terminal is unregistered, transmitting a second message on a second random access channel to access the system.
16. The method of claim 15, wherein the first message is transmitted in a manner to account for propagation delay to an access point receiving the first message.
17. A method of facilitating random access in a wireless multiple-access communication system, comprising:
 - processing a first random access channel used by registered terminals to access the system; and
 - processing a second random access channel used by registered and unregistered terminals to access the system.
18. The method of claim 17, wherein the processing for each of the first and second random access channels includes detecting for presence of transmissions on the random access channel.
19. The method of claim 18, wherein the detecting is based on a pilot that is included in each transmission on the first and second random access channels.
20. The method of claim 18, further comprising:
 - determining round trip delay for a terminal whose transmission is detected in the second random access channel.

21. The method of claim 17, wherein transmissions on the first random access channel are compensated for propagation delay, and wherein the processing the first random access channel includes
detecting for presence of a transmission in each of a plurality of slots available for the first random access channel.
22. The method of claim 21, wherein the detecting is based on a decision directed detector.
23. The method of claim 17, wherein the processing the second random access channel includes
detecting for presence of transmissions on the second random access channel by performing sliding correlation.
24. A random access channel for a wireless multiple-access multiple-input multiple-output (MIMO) communication system, comprising:
a first random access channel for use by registered terminals to access the system; and
a second random access channel for use by registered and unregistered terminals to access the system.
25. The random access channel of claim 24, wherein transmissions on the first random access channel are compensated for propagation delay.
26. The random access channel of claim 24, wherein the first and second random access channels are associated with first and second segments, respectively, in a frame.
27. The random access channel of claim 26, wherein the first and second segments are configurable for each frame.
28. The random access channel of claim 26, wherein each of the first and second segments is divided into a plurality of slots.

29. The random access channel of claim 28, wherein the duration of each of the plurality of slots for the second segment is defined to be longer than a largest expected round trip delay for terminals in the system.
30. The random access channel of claim 24, wherein the first and second random access channels are associated with first and second protocol data units (PDUs), respectively.
31. The random access channel of claim 30, wherein the first and second PDUs are associated with different lengths.
32. The random access channel of claim 30, wherein the first and second PDUs are associated with first and second reference portions, respectively.
33. The random access channel of claim 30, wherein the first PDU comprises a reference portion and a message portion that are time division multiplexed.
34. The random access channel of claim 30, wherein the second PDU comprises a reference portion and a message portion that are multiplexed on different sets of subbands.
35. The random access channel of claim 30, wherein the first and second PDUs are associated with different sets of data fields.
36. The random access channel of claim 35, wherein each of the first and second PDUs includes an identifier field.
37. The random access channel of claim 35, wherein the second PDU includes a cyclic redundancy check (CRC) field.
38. The random access channel of claim 30, wherein the first and second PDUs are associated with different coding schemes.

39. A terminal in a wireless multiple-access communication system, comprising:
a controller operative to determine a current operating state of the terminal and to select one random access channel from among at least two random access channels for use to access the system based on the current operating state; and
a data processor operative to process a message for transmission on the selected random access channel.
40. An apparatus in a wireless multiple-access communication system, comprising:
means for determining a current operating state of the apparatus;
means for selecting one random access channel from among at least two random access channels based on the current operating state; and
means for transmitting a message on the selected random access channel to access the system.
41. An apparatus in a wireless multiple-access communication system, comprising:
means for processing a first random access channel used by registered terminals to access the system; and
means for processing a second random access channel used by registered and unregistered terminals to access the system.